

# **Progress Towards an Internationally-federated Linear Collider**



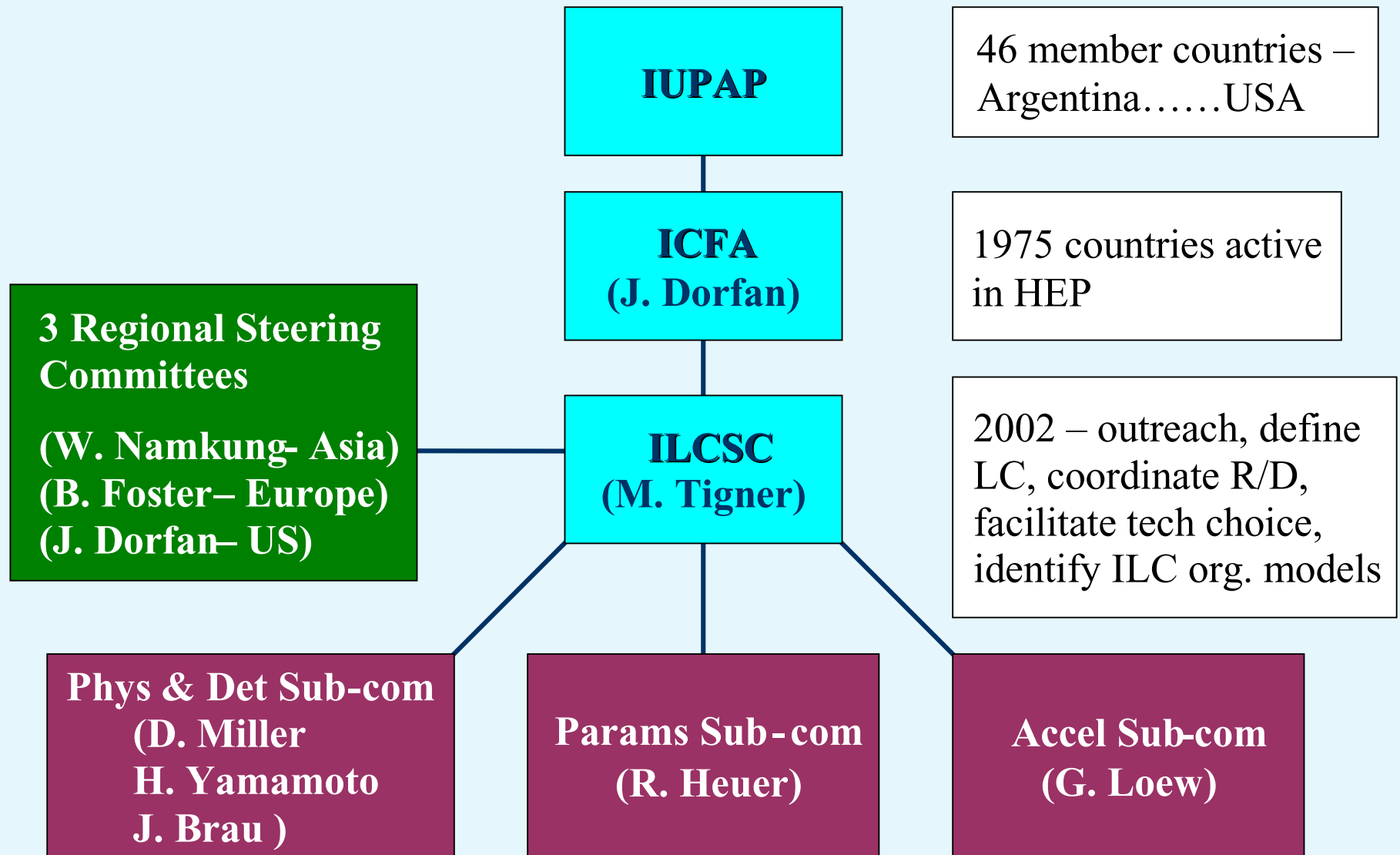
**Presentation by  
Jonathan Dorfan, SLAC**

**July 25, 2003**

**at**

**HEPAP Meeting, Bethesda Maryland**

# Scientific Community – Global Organization



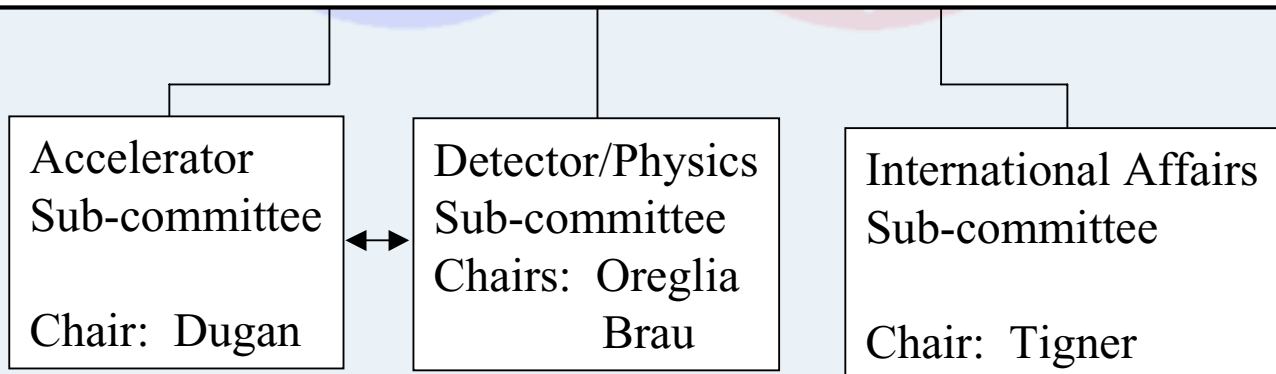
# Near Term Goals for ILCSC

- **Define the internationalized ILC in analogy with the parameters documents from regional steering committees. First report of Parameters Sub-com in Aug. 2003, goal to finish Feb. 04**
- **Set up technology recommendation process with goal of completion in Feb. 05. Based on an independent panel of Wise Persons reporting to ILCSC**
- **Set up a preliminary version of a Central Management Group to lead and manage an effort to produce an internationalized CDR and produce a plan for a TDR and supporting prototyping and industrialization**
- **Next meeting of ILCSC will be at Lepton Photon Conference at FNAL, August 2003**

# US Linear Collider Steering Group

## Executive Committee

Jonathan Bagger, Jim Brau, Sally Dawson, David Burke, Jonathan Dorfan (Chair), Gerry Dugan, Jerry Friedman, Jim Gates, Steve Holmes, Young-Kee Kim, Dan Marlow, Mark Oreglia, Maury Tigner, Mike Witherell, Harvey Lynch (Exec Secretary)



# Meeting Dates

- **30 May 2002 FNAL**
- **29 Jun 2002 19:00 to 22:00 PDT UCSC/telephone**
- **08 Aug 2002 08:00 to 10:00 and 12:00 to 15:00 PDT by telephone**
- **23 Sep 2002 10:30 to 14:00 PDT by telephone**
- **25 Nov 2002 08:30 to 12:30 PST by telephone**
- **10 Jan 2003 19:00 to 23:00 CST Arlington TX/telephone**
- **19 Feb 2003 08:00 to 12:00 PST by telephone**
- **16 Apr 2003 11:00 to 15:00 PDT by telephone**
- **11 Jun 2003 08:00 to 12:00 PDT by telephone**
- **24 Jun 2003 13:30 to 14:30 PDT by telephone**
- **15 Jul 2003 19:00 to 23:00 EDT at Cornell/telephone**

# Public Information

- \* **General:**

<http://www.slac.stanford.edu/~hll/USLCSG/>

- \* **Newsletter:**

<http://www.slac.stanford.edu/~hll/USLCSG/Newsletters/A301.doc>

- \* **Machine Scope Document:**

<http://www.slac.stanford.edu/~hll/USLCSG/BidToHost/MachineScopeA30323.pdf>

- \* **Charter:**

[http://www.slac.stanford.edu/~hll/USLCSG/General/LCSG\\_Charter.pdf](http://www.slac.stanford.edu/~hll/USLCSG/General/LCSG_Charter.pdf)

- \* **Meeting Dates:**

<http://www.slac.stanford.edu/~hll/USLCSG/General/MeetDates.txt>

- \* **Outreach:**

[http://quark.phy.bnl.gov/~dawson/colls\\_lc.html](http://quark.phy.bnl.gov/~dawson/colls_lc.html)

- \* **Miscellaneous Info:**

<http://www.slac.stanford.edu/~hll/USLCSG/General/index.html>

# USLCSG – University R&D Program

- **USLCSG – coordinated proposal review process worked well in 2002. Money is now flowing to PIs**
- **We will follow a similar process in 2003. We have invited back the same group of reviewers as last year. All but one will serve again**
  - ~ **Will tweak the process a little in order to be more helpful to agencies**
- **Review committees will meet at FNAL sometime in November 2003**

# 2002 LC R&D Review Committees

## **Detector Committee:**

**Howard Gordon, Brookhaven (chair)**

**Rolf Heuer, U. Hamburg**

**Steve Olsen, U. Hawaii**

**Mike Roney, U. Victoria**

**Sally Seidel, U. New Mexico**

**Hitoshi Yamamoto, Tohoku U.**

## **Accelerator Committee:**

**Norbert Holtkamp, ORNL (chair)**

**Phil Burrows, Oxford**

**Jean Delayen, JLab**

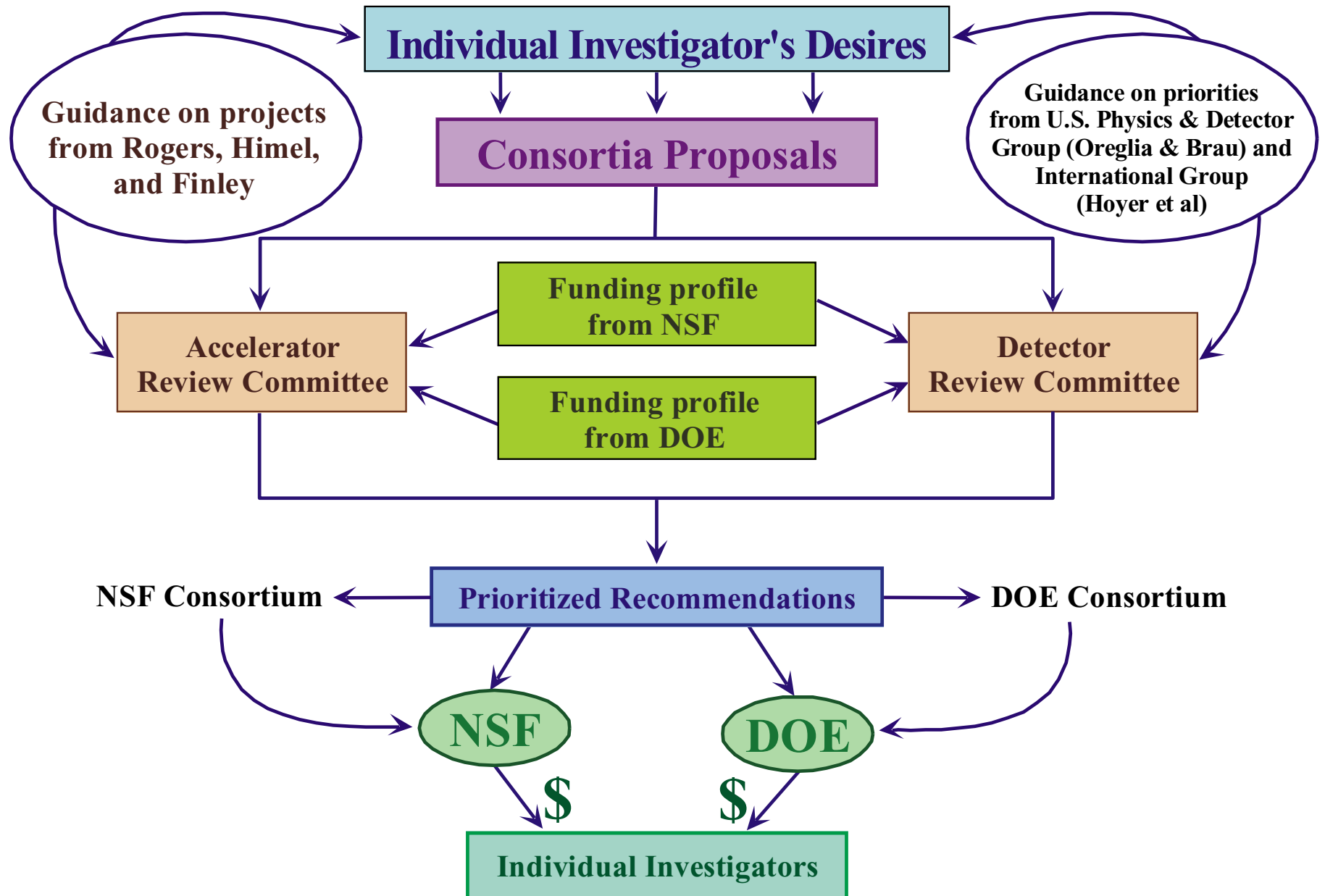
**Tom Himel, SLAC**

**Hugh Montgomery, Fermilab**

**Katsunobu Oide, KEK**



# University LC Accelerator & Detector R&D Funding



# USLCSG – Scope Document

- **USLCSG Detector/Physics Subcommittee took on the task of defining the key machine parameters. They have produced a document which is the basis for the comparative study of warm and cold technologies**
  - ~ **See talk of Mark Oreglia at the Cornell American LC Workshop**  
**<http://www.lepp.cornell.edu/public/LC/workshop/program.html>**

# Design Considerations for an International Linear Collider

The American Linear Collider Physics Group  
Executive Committee [1]

23 March 2003

## Abstract

We describe the physics-motivated minimal design specifications for an  $e^+e^-$  linear collider. Machine options and upgrades are also discussed. We conclude that such a machine should have the following capabilities:

- Initial center-of-mass energy:  $\sqrt{s}=500$  GeV
- Integrated luminosity at  $\sqrt{s}=500$  GeV:  $500 \text{ fb}^{-1}$  within four years of physics running, corresponding to a design luminosity of approximately  $2 \times 10^{34} \text{ cm}^{-2}\text{s}^{-1}$
- Electron polarization: at least 80%
- Energy upgradeable to approximately 1 TeV or more
- Capability for occasional running at  $\sqrt{s}=91$  GeV
- Accomodation for two experiment halls
- Possibility of a beam crossing angle

# **USLCSG – Guidance for the Technology Choice**

- **The USLCSG accelerator subcommittee took on the challenging task of providing for the world community a comparison of a US-based machine using either warm or cold technology. This task will be complete before the end of 2003**

~ **See talk of Gerry Dugan at the Cornell American LC Workshop**

**<http://www.lepp.cornell.edu/public/LC/workshop/program.html>**

# **USLCSG: Charge for Technology Options Study**

- **Two technology options are to be developed: a warm option, based on the design of the NLC Collaboration, and a cold option, similar to the TESLA design at DESY**
- **Both options will meet the physics design requirements specified by the USLCSG Scope document**
- **Both options will be developed in concert, using, as much as possible, similar approaches in technical design for similar accelerator systems, and a common approach to cost and schedule estimation methodology, and to risk/reliability assessments**

# US LC physics requirements specified by the USLCSG Physics/detector Subcommittee

- initial energy 500 GeV c.m.
- upgrade energy: at least 1000 GeV c.m.
- electron beam polarization  $> 80\%$
- an upgrade option for positron polarization
- integrated luminosity  $500 \text{ fb}^{-1}$  within the first 4 yrs of physics running, corresponding to a peak luminosity of  $2 \times 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$
- beamstrahlung energy spread comparable to initial state radiation
- site consistent with two experimental halls and a crossing angle
- ability to run at 90-500 GeV c.m. with luminosity scaling with  $E_{\text{cm}}$

# Task Forces

- **To carry out the charge, the Accelerator Subcommittee has formed four task forces:**
  - ~ **Accelerator physics and technology design**
  - ~ **Cost and schedule**
  - ~ **Civil construction and siting**
  - ~ **Availability design**
- **Risk assessment will be carried out by a team formed from members of the other 4 task forces**

# Task Force Membership

## 1. Accelerator physics and technology design task force

- Chris Adolphsen (SLAC)
- Gerry Dugan<sup>1,2</sup> (Cornell)
- Helen Edwards (Fermilab)
- Mike Harrison<sup>2</sup> (BNL)
- Hasan Padamsee<sup>2</sup> (Cornell)
- Tor Raubenheimer<sup>2</sup> (SLAC)

## 2. Site-specific civil design (CA and Fermilab sites) task force

- Dave Burke<sup>2</sup> (SLAC)
- Clay Corvin (SLAC)
- Dave Finley<sup>2</sup> (Fermilab)
- Steve Holmes<sup>1,2</sup> (Fermilab)
- Vic Kuchler (Fermilab)
- Marc Ross (SLAC)

## 3. Cost and schedule task force

- Dave Burke<sup>1,2</sup> (SLAC)
- John Cornuelle (SLAC)
- Dave Finley<sup>2</sup> (Fermilab)
- Warren Funk (Jefferson Lab)
- Peter Garbincius (Fermilab)
- Mike Harrison<sup>2</sup> (BNL)
- Steve Holmes<sup>2</sup> (Fermilab)
- Ted Lavine (SLAC)
- Cindy Lowe (SLAC)
- Tom Markiewicz (SLAC)
- Hasan Padamsee<sup>2</sup> (Cornell)
- Brett Parker (BNL)
- Kem Robinson (LBNL)
- John Sheppard (SLAC)

## 4. Availability Design and Specification

- Paul Czarapata (Fermilab)
- Helen Edwards (Fermilab)
- Tom Himel<sup>1</sup> (SLAC)
- Marcus Huening (Fermilab)
- Nan Phinney (SLAC)
- Marc Ross (SLAC)

<sup>1</sup>Primary liaison to USLCSG Accelerator Subcommittee

<sup>2</sup>USLCSG Accelerator Subcommittee member

DESY points-of-contact:

Cost/schedule and siting: Franz Peters

Design: Stefan Choroba



# Guidelines for LC option design

**The reference designs for the warm and cold options will be similar to, but not identical with, the NLC design of the JLC/NLC collaboration and the TDR design of the TESLA collaboration. Major system-level changes from these designs will be limited to those which fall into the following categories:**

- Changes required to meet the machine specifications stipulated by the USLCSG**
- Changes motivated by clearly-identified major cost reductions, or major reliability/operability issues**
- Technically benign changes which make the comparison between the options simpler and more straightforward**

# Cost and schedule task force: Charge and Interpretation

## Charge

**“The Cost and Schedule (C&S) Task Force is charged to provide estimates of the TPC and schedule for completion of each of the machine configurations if entirely funded by the U.S. and built in the United States by U.S. labs and universities and global industries on a competitive basis.”**

## Interpretation

- **“Provide” not “Make”**
  - ~ Fully utilize existing work done by NLC/JLC and TESLA Collaborations
  - ~ Fully utilize previous analysis of this work. (E.g. Fermilab-led restatement of costs from TESLA, and Lehman Review of the NLC)
- **Configurations provided by the Accelerator Design Task Force for the warm and cold technology options may (are) not exactly the official NLC/JLC or TESLA Collaboration configurations**

# Schedule for LC option evaluation

- **Jan. 10:** Charge to Accelerator Subcommittee from USLCSG Executive Subcommittee
- **April 14:** Joint task force meeting #1
- **April 16,** June 11, July 15: Status reports to USLCSG ExecComm
- **May 22-23** Cost review meeting at DESY
- **June 5-6** Design review meeting at DESY
- **June 15-16:** Joint task force meeting #2
- **July 13:** report on work at Cornell ALCW meeting
- **mid-August:** 2<sup>nd</sup> cost review at DESY
- **August 27-28:** Joint task force meeting #3
- **September :** Completion of task force work, writing of final report, and submission of report to the USLCSG Executive Committee; presentation to observers from DESY, CERN, KEK

# **Evolving to an Internationally-based Effort**

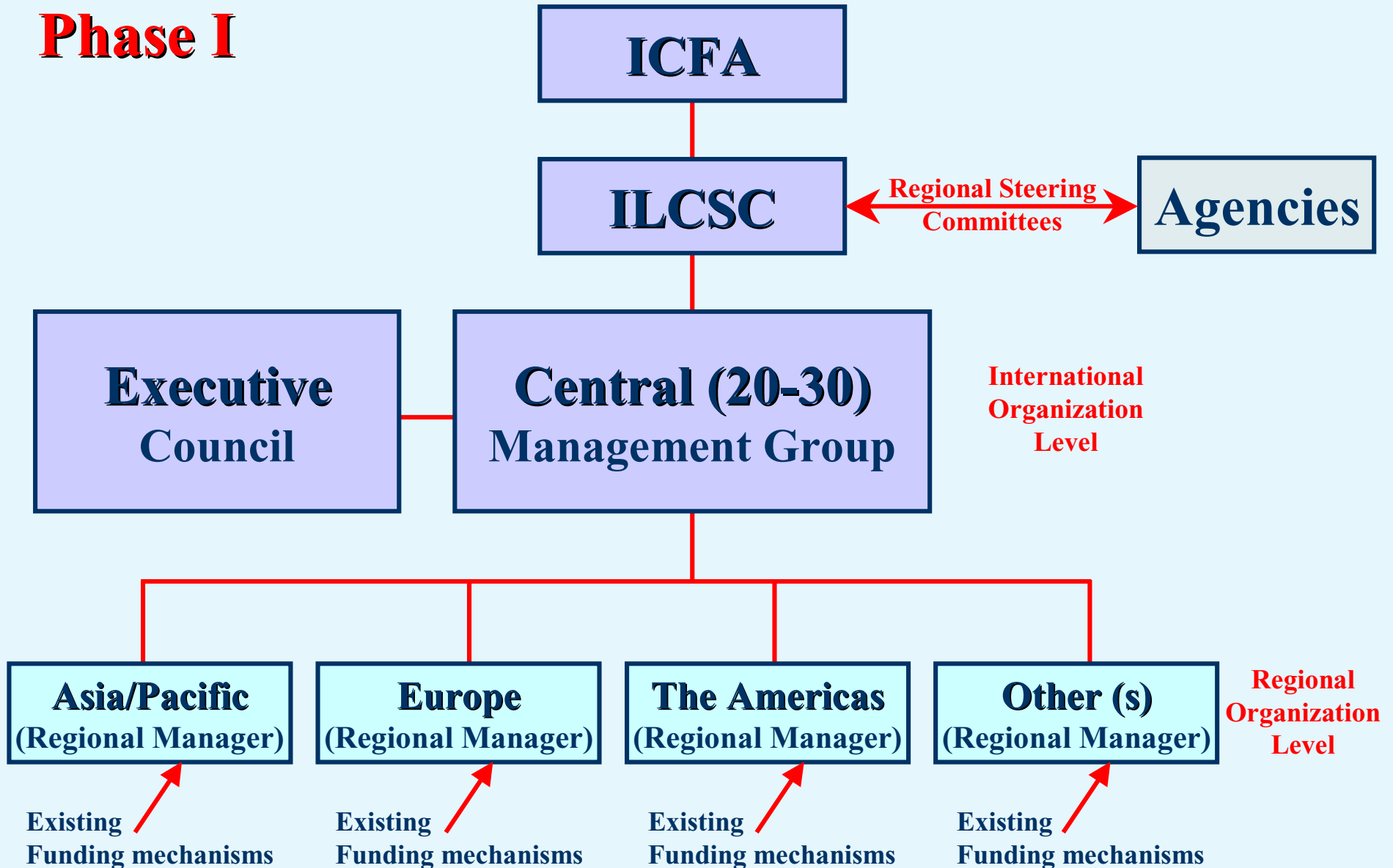
- **Once the technology decision is made, an internationally-constituted design group needs to be formed with the task of providing a Technical Design Report that is truly owned by the international partners. The USLCSG is formulating a concrete proposal on how to achieve this. Such a proposal is needed as input to the ILCSC discussions this summer**

# **Key Milestones for Internationalizing the LC**

- **Choose Technology and Create Central Management Group (Feb. 05)**
- **Complete Conceptual Design and the Plan for completion of Technical Design Report (Fall 2005 – see Phase I schematic below)**
- **Complete Technical Design Report, etc. (Phase II schematic below, Fig. 2, 2007?)**
- **Obtain final International Approvals (2008?)**
- **Begin Construction (2009)**
- **Begin Physics (2014)**

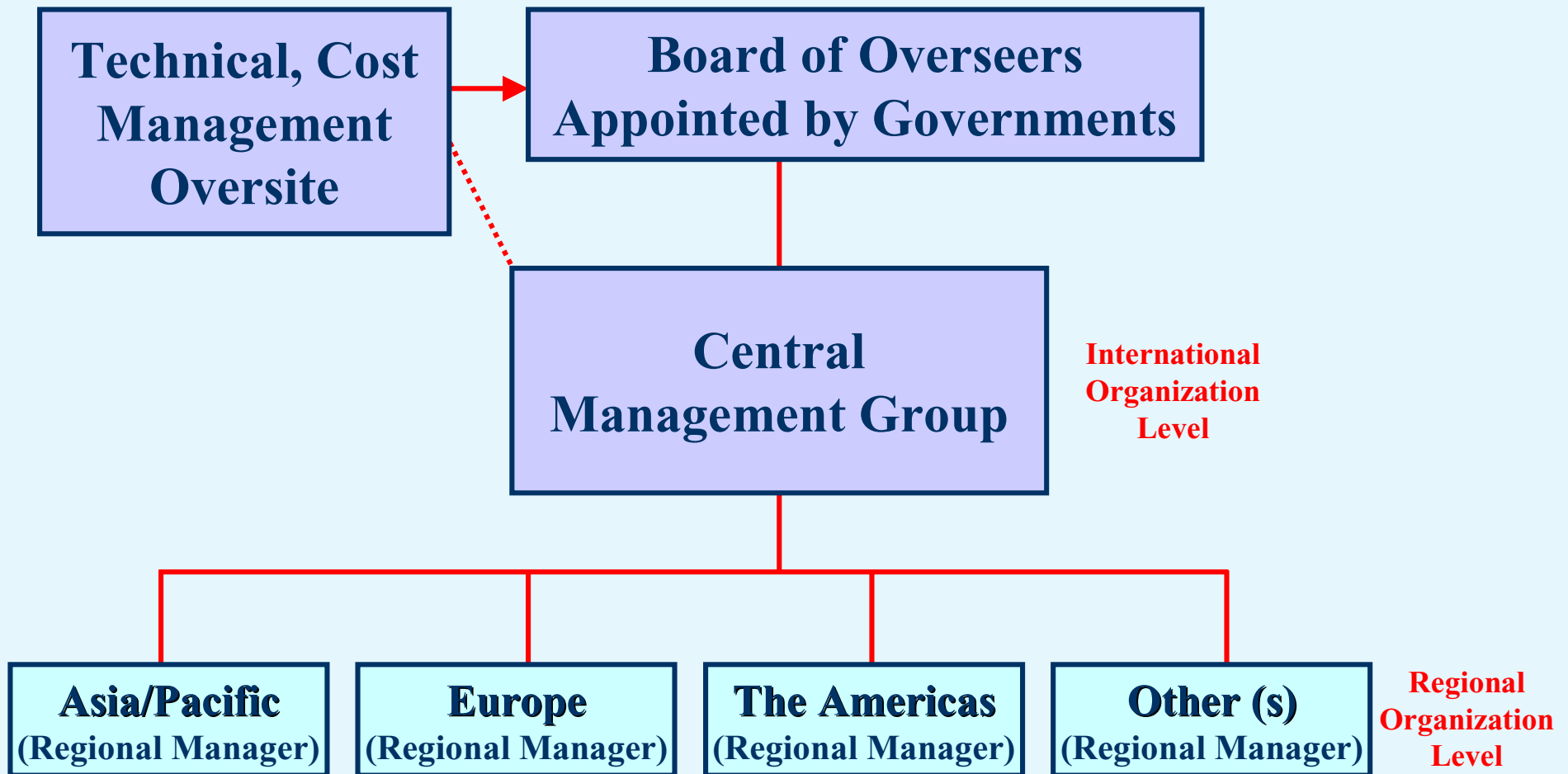
# USLCSC Proposal - July 2003

## Phase I



# USLCSC Proposal - July 2003

## Phase II



- Deliverables:
- a) Technical design, cost and schedule, plan for industrialization, ...
  - b) Construction Management Plan, Operations Management Plan

# Discussions with Governments

- **Since January 2003, there have been active, ongoing and constructive discussions with DOE, NSF, OSTP and OMB regarding an internationally-constituted LC. These discussions center on providing for the Government a clear picture of the US and international scientist's discussions and proposed plans**
  - ~ **We had an all-day meeting last Thursday in Washington which included representatives from the DOE, NSF and OSTP**

**These meetings have provided a mechanism for getting invaluable feedback regarding our planning as well as preparing the government officials for the initial discussions that are now beginning amongst the governments of the three regions**

- **Representatives of major governments interested in LC will meet in London July 29-30, 2003 for a “zeroth-order” discussion**



# **Discussions with Governments**

## **(continued)**

- **OECD Ministerial Statement Regarding the Importance of International Co-operation on Large Accelerator-based Projects in High-Energy Physics is in preparation**
- **Ministers express their appreciation for the work of the OECD Global Science Forum Consultative Group on High-Energy Physics. They welcome the report from the first two-year phase of the work of the Consultative Group and commend the clarity and world-wide consensus achieved amongst the scientific community in developing the Roadmap for future large accelerator-based facilities**